STRAWBERRY (*Fragaria x ananassa* 'Radiance')
Botrytis fruit rot; *Botrytis cinerea*

L. Cordova, A. Zuniga, J. Mertely, and N.A.Peres
University of Florida, GCREC
14625 County Road 672
Wimauma, FL 33598

Evaluation of biorational products for control of Botrytis fruit rot in annual strawberry, 2014-15.

A trial was established on a commercial farm in Plant City, FL to test the efficacy of different biorational products in the management of Botrytis fruit rot (BFR) of strawberry. On 11 Oct 14, bare-root transplants were planted into plastic-mulched raised beds, 28-in. wide on 4-ft centers and with two staggered rows of plants spaced 15 in. apart within and between rows. Beds had been treated with Pic-Clor 60 (200 lb/A) prior to mulching. Twenty treatments were arranged in a randomized block design with four blocks in adjacent rows. Plots consisted of 12 plants each in 9.4-ft of bed and were separated by 3-ft of empty bed. To facilitate establishment, plants were overhead irrigated for 10 days and then drip irrigation was used to deliver water and fertilizer throughout the season. The products were applied using a CO_2 back-pack sprayer calibrated to deliver 100 gal/A at 60 psi. The boom was fitted with two T-Jet 8002 hollow-cone nozzles. Treatments were sprayed weekly, from 21 Nov to 20 Feb (14 applications). Most of the treatments were applied weekly, except for two containing Switch applied when weather conditions were favorable for infection and either Captan or Actinovate during the other weeks. The weather-triggered applications during bloom periods were made on 28 Nov (week 2), 5 Dec (3), 26 Dec (6), 2 Jan (7), 16 Jan (9) and 13 Feb (13). During the course of the season, fruit were harvested twice a week from 9 Dec to 27 Feb (23 harvests). Yield was determined by counting and weighing the marketable fruit; cull and diseased fruits were also graded. BFR incidence was expressed as a percentage of all fruit harvested. Data were analyzed by two-way ANOVA and treatment means were separated by Tukey-Kramer least squares means (α=0.05) in SAS.

A disease monitoring system developed in Florida showed that the 2014-15 strawberry season had 24 days when weather conditions were favorable for BFR development (temperatures between 15 and 22 °C and $\geq$ 6 h of leaf wetness). Jan 12 to 16 and Feb 9 to 10 were the most suitable periods for BFR, and as a result, severe epidemics occurred in the second half of Jan and second half of Feb. However, BFR incidence was moderate to high during the entire season. BFR incidence was calculated for the season and for the two disease peaks (6 to 27 Jan and 10 to 27 Feb), when disease incidence in the non-treated control reached 36 and 50%, respectively. Disease incidence for the entire season showed that only 5 of the 20 treatments were effective reducing BFR incidence compared to the non-treated control. These included both treatments that contained Switch, Thiram, Code ZS + SilWet, and Code AZ + SilWet. At the first and second disease peaks, the same 5 treatments were effective in reducing BFR incidence compared to the non-treated control except for the treatment using Code AZ + SilWet during the second peak. Only the treatments with Switch and Thiram increased yield compared to the non-treated control

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Treatment (products and rates/A)	Application timing [z]	Yield (lb/a)	Botrytis fruit rot (%) [y] 1st Peak	2nd Peak	Season
Switch (14 oz) Captan 80WDG (1.9 lb)	2, 3, 6, 7, 9, 13 1, 4, 5, 8, 10, 11, 12, 14	28810 a	8.9 g	18.0 f	8.5 g [x]
Switch (14 oz) Actinovate (6 oz)	2, 3, 6, 7, 9, 13 1, 4, 5, 8, 10, 11, 12, 14	28214 a	13.1 fg	21.3 f	11.5 fg
Thiram 24/7 (3 pt)	weekly	28849 a	15.4 efg	23.0 ef	12.7 fg
Zen-O-Spore (3 lb) + SilWet L-77 (0.1% = 0.8 pt/A)	weekly	14873 c	15.9 defg	28.5 def	13.8 efg
Armour-Zen (2 qt) + SilWet L-77 (0.1% = 0.8 pt/A)	weekly	13977 c	19.5 cdefg	33.5 bcdef	17.2 def
Captec 4L (2 qt)	weekly	25583 ab	22.3 bcdefg	32.9 bcdef	18.2 cdef
Milstop (potassium bicarbonate) (2.5-5 lb) 3.75 lb	weekly	17390 bc	21.0 bcdefg	30.6 cdef	18.5 cdef
Tavano (polyoxin-D) (6.5 fl oz)	weekly	22500 abc	21.6 abcdef	40.6 abcde	20.6 bcdef
SA-0540101 (4.5 lb)	weekly	22168 abc	25.2 abcdef	44.1 abcd	22.5 abcde
Actigard (acibenzolar-S-methyl) (0.375 oz)	weekly	17622 bc	30.9 abcd	48.7 abc	25.6 abcd
Regalia (Extract of Reynoutria sachalinensis) (2qt)	weekly	18780 bc	29.3 abcde	49.8 abc	25.7 abcd
Serenade Opt (Bacillus subtilis) (1lb)	weekly	21012 abc	31.3 abcd	47.7 abcd	26.9 abcd
Taegro (Bacillus subtilis var. amyloliquefaciens) (2.6 oz)	weekly	21870 abc	28.3 abcde	50.7 ab	27.1 abcd
Fracture (Lupinus alba) (24.4 fl oz)	weekly	17593 bc	28.5 abcde	52.4 ab	27.1 abcd
Double Nickel (Bacillus amyloliquefaciens) (1.5 qt)	weekly	19347 bc	31.4 abcd	47.7 abcd	27.2 abcd
Non-treated control	-	17570 bc	36.4 ab	49.5 abc	28.3 abc
Serenade ASO (Bacillus subtilis) (4 qt)	weekly	17530 bc	33.1 abc	53.9 a	30.0 ab
BAS 97471 (0.5 lb)	weekly	16543 c	37.8 a	53.3 a	30.5 ab
Oxidate (hydrogen peroxide) (4 qt = 128 fl oz)	weekly	16782 bc	36.8 ab	55.9 a	31.5 ab
Actinovate (Streptomyces lydicus) (6 oz)	weekly	18560 bc	36.8 ab	55.7 a	32.5 a

[z] Weeks of application over a period of 14 weeks from 21 Nov 14 to 20 Feb 15.

[y] Incidence of Botrytis fruit rot during three periods, first disease peak period (6 Jan to 27 Jan 15), second disease peak period (10 Feb to 27 Feb 15) and whole season (16 Dec 13 to 27 Feb 15).

[x] Means in a column followed by the same letter are not significantly different by Tukey-Kramer Least Square Means (α=0.05).

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